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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* MARK BEAUMONT

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Appeal 2008-004268  
Application 10/689,390  
Technology Center 2100

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Decided: September 15, 2009

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*Before ALLEN R. MACDONALD, ST. JOHN COURtenay III, and  
DEBRA K. STEPHENS, Administrative Patent Judges.*

STEPHENS, *Administrative Patent Judge.*

DECISION ON APPEAL  
STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134(a) from a final rejection of claims 1-36. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

*Introduction*

According to Appellant, the invention is a system and method for rotating data in a plurality of processing elements using shifting and storing operations to enable a three shears operation on the data (Abstract). The storing operations are responsive to the processing element's positions (*id.*).

*Exemplary Claim(s)*

Claims 1, 8, and 22 are exemplary claims and are reproduced below:

1. A method of rotating data in a plurality of processing elements, comprising:
  - a plurality of shifting operations performed by a plurality of processing elements connected in an array; and
  - a plurality of storing operations performed by said plurality of processing elements, said shifting and storing operations coordinated to enable a three shears operation to be performed on the data, and wherein said plurality of storing operations is responsive to each processing elements' positions in said array.
  
8. A method of rotating data in a plurality of processing elements, comprising:
  - a first shifting of a first plurality of data in a first direction;
  - a first storing of data by a first plurality of said processing elements in response to said first shifting and the positions of said first plurality of processing elements;
  - a second shifting of a second plurality of data in a second direction perpendicular to said first direction;
  - a second storing of data by a second plurality of processing elements in response to said second shifting and the positions of said second plurality of processing elements;
  - a third shifting of a third plurality of data in a third direction opposite to said first direction; and
  - a third storing of data by a third plurality of processing elements in response to said third shifting and the positions of said third plurality of processing elements.

22. A method of rotating data in a plurality of processing elements, comprising:

a first shifting of a first plurality of said processing elements in response to said first shifting and the positions of said first plurality of processing elements;

a second shifting of a second plurality of a data in a second pair of directions perpendicular to said first pair of directions;

a second storing of data by a second plurality of processing elements in response to said second shifting and the positions of said second plurality of processing elements;

a third shifting of a third plurality of data in said first pair of directions; and

a third storing of data by a third plurality of processing elements in response to said third shifting and the positions of said third plurality of processing elements.

#### *Prior Art*

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Taylor	4,992,933	Feb. 12, 1991
Crozier	5,081,700	Jan. 14, 1992
Pechanek	6,338,129 B1	Jan. 8, 2002

#### *Rejections*

The Examiner rejected claims 1-6, 8-13, 15-20, 22-27, 29-34, and 36 under 35 U.S.C. § 103(a) as being unpatentable over Crozier and Pechanek and claims 7, 14, 21, 28, and 35 under 35 U.S.C. § 103(a) as being unpatentable over Crozier, Pechanek, and Taylor.

#### GROUPING OF CLAIMS

(1) Appellant argues claims 1 and 36 as a group based on arguments made with respect to claim 1 (App. Br. 8). We will, therefore, treat claim 36 as standing or falling with representative claim 1. Since dependent claims 2-6 and 14-20 were not separately argued, we will also treat claims 2-6 and 14-20 as standing or falling with representative claim 1.

(2) Appellant argues claims 8 and 15 as a group based on arguments made with respect to claim 8 (App. Br. 8-9). We will, therefore, treat claim 15 as standing or falling with representative claim 8. Since dependent claims 9-14 and 16-21 were not separately argued, we will also treat claims 9-14 and 16-21 as standing or falling with representative claim 8.

(3) Appellant argues claims 22 and 29 as a group based on arguments made with respect to claim 22 (App. Br. 9-10). We will, therefore, treat claims 29 as standing or falling with representative claim 22. Since dependent claims 23-27 and 30-34 were not separately argued, we will also treat claims 23-27 and 30-34 as standing or falling with representative claim 32.

We accept Appellant's grouping of the claims. *See* 37 C.F.R. § 41.37(c)(1)(vii) ("Notwithstanding any other provision of this paragraph, the failure of appellant to separately argue claims which appellant has grouped together shall constitute a waiver of any argument that the Board must consider the patentability of any grouped claim separately.").

## ISSUE 1

*35 U.S.C. § 103(a): claims 1 and 36*

### APPELLANT'S CONTENTIONS

Appellant contends the Examiner used an improper “could be” legal standard, not the “more probable than not” legal standard required (App. Br. 5, § (vii)A.1.).

### EXAMINER'S RESPONSE

In response, the Examiner maintains the Applicant took the statement out of context and disagrees with Appellant.

*Issue 1:* Has Appellant met the burden of showing the Examiner erred in the standard used in rejecting the claims under 35 U.S.C. § 103(a)?

## ISSUE 2

*35 U.S.C. § 103(a): claims 1-6 and 36*

### APPELLANT'S CONTENTIONS

Appellant argues neither Crozier nor Pechanek discloses shifting and storing operations performed by a “plurality of processing elements connected in an array” for performing a rotation of data (App. Br. 8, §(vii)A.2.a.). Appellant further argues neither reference discloses the storing operations are “responsive to each processing element's position in said array” (*id.*). Appellant contends Crozier has a certain configuration, and the inherent method performed by the normal and usual operation of the rotation

hardware will be significantly different from the method for rotating data in a plurality of processing elements (*id.*). Pechanek discloses a nearest neighbor torus connected computer with no mention of a method for rotating data in the nearest neighbor torus connected computer (*id.*)

#### EXAMINER'S RESPONSE

The Examiner in contrast finds Appellant is attacking the references individually (Ans. 15, §(10)(40)). Crozier teaches a three shears shifting process done on a single processor while Pechanek teaches that many computing tasks, such as image processing, can operate in parallel (*id.*). Therefore, it would have been obvious to one of ordinary skill in the art that image processing applications would be performed on the nearest neighbor torus (*id.*).

*Issue 2:* Has Appellant met the burden of showing the Examiner erred in finding Crozier and Pechanek teach the limitations of claims 1 and 8?

#### ISSUE 3

*35 U.S.C. § 103(a): claims 8-13 and 15-20*

#### APPELLANT'S CONTENTIONS

Appellant reiterates the arguments for claims 1 and 36 (App. Br. 8, §(vii)A.2.b.). Additionally, Appellant contends the output of the barrel shifter, which performs the first and third shifting operations, is never stored in the rotation hardware (*id.*). Appellant further argues Pechanek does not teach a method for rotating data in the nearest neighbor torus connected computer (App. Br. 9, §(vii)A.2.b.).

The Examiner states Appellant has only addressed how each reference relates to the claims and has not addressed the combination of Crozier and Pechanek (Ans. 15, §(10) 40.).

*Issue 3:* Has Appellant met the burden of showing the Examiner erred in finding Crozier and Pechanek teach the limitations of claims 8 and 13?

#### ISSUE 4

*35 U.S.C. § 103(a): claims 22-27 and 29-34*

#### APPELLANT'S CONTENTIONS

Appellant again reiterates the arguments set forth above with respect to claims 1 and 36 (App. Br. 9, §(vii)A.2.c.). Appellant further contends that because rotating data by shifting data in a pair of directions is not carried out by any references of record, to achieve the invention as recited, the combination of Crozier and Pechanek would need further modification (*id.*). Appellant argues the Examiner used hindsight to develop this modification (*id.*).

#### EXAMINER'S RESPONSE

The Examiner states Crozier and Pechanek failed to teach first shifting on a plurality of data in a first pair of directions, second shifting on a plurality of data done in a second pair of directions, and third shifting on a plurality of data done in a third pair of directions (Ans. 10, §(9) 21.). However, the Examiner states that it would have been obvious to one of ordinary skill in the art to perform a pair of shifts for each cycle of shifting (*id.*). The Examiner then details how the disclosure in Figure 5 of Crozier would lead one of ordinary skill in the art to realize shifting in two different

directions would result in a saving of many shifting cycles; therefore, a skilled artisan would implement this shifting (*id.*).

*Issue 4:* Has Appellant met the burden of showing the Examiner erred in finding Crozier and Pechanek teach the limitations of claims 22 and 29?

## ISSUE 5

*35 U.S.C. § 103(a): claims 1-6, 8-13, 15-20, 22-27, 29-34, and 36*

### APPELLANT'S CONTENTIONS

Appellant next asserts the combination of Crozier and Pechanek has no reasonable expectation of success (App. Br. 10, §(vii)A.3). Appellant argues the normal and usual operation of the rotation hardware of Crozier cannot be performed on the significantly different nearest neighbor torus connected computer structure of Pechanek (*id.*). Appellant argues Crozier may only be performed on hardware similar to that disclosed in Crozier to have any reasonable expectation of success (*id.*).

### EXAMINER'S RESPONSE

The Examiner teaches Pechanek explicitly states a nearest neighbor torus is a conventional approach to parallel processing architectures which includes image processing (Ans. 16). Therefore, the Examiner concludes one of ordinary skill in the art at the time of the invention would be able to implement the method of rotating data from Crozier onto the processor of Pechanek (*id.*).

*Issue 5:* Have Appellant met the burden of showing the Examiner erred in concluding one skilled in the art at the time of the invention would have had success in including the rotation technique of Crozier onto the processor of Pechanek?

## ISSUE 6

*35 U.S.C. § 103(a): claims 1-6, 8-13, 15-20, 22-27, 29-34, and 36*

### APPELLANT' CONTENTIONS

Appellant next assert the Examiner has only provided a broad conclusory statement as to why it would have been obvious to one of ordinary skill in the art to implement Crozier's method of image rotation on the parallel processor of Pechanek (App. Br. 11, §(vii)A.4). Also, Appellant argue Pechanek discloses the technique introduces latency and Crozier discloses the rotation hardware efficiently processes images by reducing the character generator memory required for image storage (*id.*).

### EXAMINER'S RESPONSE

The Examiner agrees Pechanek adds latency into transferring data from a processing element to another, but that is not the same as "no motivation to combine the references." But, Pechanek discloses image processing can draw upon the efficiency of parallel processing and Crozier shifts data (Ans. 16 §(10) 40.). Therefore, the combination is capable of performing multiple shifts in a cycle – an efficiency that is motivation to combine (*id.* at 17).

*Issue 4:* Has Appellant met the burden of showing the Examiner erred in concluding one skilled in the art at the time of the invention would have been motivated to include the rotation technique of Crozier onto the processor of Pechanek?

#### FINDINGS OF FACT (FF)

##### *Crozier Reference*

(1) Crozier describes a system, method, and architecture for shifting the output of a bit matrix character generator ninety degrees to provide ninety degrees shifted characters (Abstract). A barrel shifter barrel shifts bit slices of the bit matrix characters coupled to a linear array shifter for linear array shifting the information that was first barrel shifted (*id.*).

(2) Crozier teaches rotation of a character using alphanumeric bit positions (col. 5, ll. 39-41 and Figs. 5A – 5D). In the first step, micro columns S2 through S8 have been barrel shifted by 1 through 7 bit positions respectively (col. 5, ll. 44-46 and Figs. 5A and 5B). The end around bit shifted character 5B is further linear array shifted by end around shifting the horizontal rows R1 through R8 zero through seven bit positions to provide information at the input of the barrel shifter 28 via line 35 (col. 5, ll. 46-50 and Figs. 5B and 5C). This information is again barrel shifted during the second pass to provide a character having bit positions or alphanumeric bit positions (col. 5, ll. 50-55 and Figs. 5C and 5D) which is the equivalent of the character H shifted 90 degree (Figs. 4A and 4D).

*Pechanek Reference*

(3) Pechanek relates to processing systems in general and, more specifically, to parallel processing architectures (col. 1, ll. 8-10).

(4) Many computing tasks can be developed that operate in parallel on data such as image processing, pattern recognition, and computer graphics applications (col. 1, ll. 13-20).

(5) Since a torus connected computer may be obtained by adding wraparound connections to a mesh-connected computer, a mesh-connected computer, one without wraparound connections, may be thought of as a subset of torus connected computers (col. 1, ll. 50-54).

(6) The conventional torus-connected array includes sixteen processing elements connected in a four by four array 10 of processing elements (col. 2, ll. 6-8).

(7) Each processing element communicates to its nearest North (N), South (S), East (E) and West (W) neighbor with point to point connections (col. 2, ll. 10-12). An example connection is a wraparound connection, representing one of the wraparound interfaces that forms the array into a torus configuration (col. 2, ll. 12-16).

**PRINCIPLES OF LAW**

Appellants have the burden on appeal to the Board to demonstrate error in the Examiner's position. *See In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary

indicia of nonobviousness.”) (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)).

The Supreme Court in *Graham v. John Deere*, 383 U.S. 1, 17-18 (1966), stated that three factual inquiries underpin any determination of obviousness:

Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy.

The Supreme Court reaffirmed and relied upon the *Graham* three pronged test in its consideration and determination of obviousness in the fact situation presented in *KSR Int'l. v. Teleflex Inc.*, 550 U.S. 398, 415-16 (2007). The Court stated:

While the sequence of these [Graham] questions might be reordered in any particular case, the factors continue to define the inquiry that controls. If a court, or patent examiner, conducts this analysis and concludes the claimed subject matter was obvious, the claim is invalid under § 103.

*KSR*, 550 U.S. at 407. Further, the Court stated:

To facilitate review, this analysis should be made explicit. See *In re Kahn*, 441 F.3d 977, 988 (C.A. Fed. 2006) (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”).

*Id.* at 418.

## ANALYSIS

We note that the Reply Brief is properly used to respond to points of argument raised by the Examiner in the Answer and not as a means for presenting new arguments. *See Optimus Tech., Inc. v. Ion Beam Applications S.A.*, 469 F.3d 978, 989 (Fed. Cir. 2006) (an issue not raised in an opening brief is waived). We have fully considered the responses in the Reply Brief to the extent that Appellant restates previous arguments or address new points raised by the Examiner in the Answer. However, we decline to address any new arguments not originally presented in the principal Brief.

### *Issue I*

We find the Examiner applied the correct legal standard. Although the Examiner used, in a parenthetical statement, “could be” in stating “Pechanek disclosed a plurality of processing elements that the image rotation method of Crozier could be done on,” the Examiner set forth the proper basis for rejection further in the section addressing the rejection (*See* Final Rej. 4, 10. and Ans. 4, §(9) 3.). Specifically, the Examiner stated “[o]ne of ordinary skill in the art would have been motivated . . . ” and “it would have been obvious to one of ordinary skill in the art to implement” Crozier’s method into the system of Pechanek.

Therefore, we find the Examiner did not err.

*Issue 2*

With respect to Appellant's arguments, we find the arguments unpersuasively focus on the individual differences between claims 1 and 36 and the Crozier and Pechanek references. It is apparent, however, from the Examiner's line of reasoning in the Answer, that the basis for the obviousness rejection is the combination of Crozier and Pechanek. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. *In re Keller*, 642 F. 2d 413, 425 (CCPA 1981); *In re Merck & Co.*, 800 F. 2d 1091, 1097 (Fed. Cir. 1986).

In other words, while Appellant contends that the references cannot be combined because Crozier does not teach processing elements connected in an array, this limitation is taught by Pechanek (FF 6). Additionally, Pechanek teaches communicating to its nearest neighbor (FF 7) and Crozier teaches rotating data (FF 2).

Accordingly, we find the combination of Crozier and Pechanek teaches the invention as recited in claims 1 and 36.

*Issue 3*

Again, we find Appellant's arguments unpersuasively focus on the individual differences between the claim (here, claims 8 and 15) and the Crozier and Pechanek references. As stated above, we find Pechanek teaches an array of processing elements (FF 6). Appellant is also arguing limitations not recited in the claim (e.g., "the output of the barrel shifter is never stored in the rotation hardware"). We find Pechanek teaches

communicating in four different directions (FF 7) and Crozier teaches shifting data (FF 1).

Based on the teachings of Pechanek and Crozier, we find the combination of Pechanek and Crozier teaches the invention as recited in claims 8 and 15.

*Issue 4*

In response to arguments repeated (i.e., arguments with respect to claims 1 and 36 and claims 8 and 15), we find as stated above.

As to Appellant's further arguments, we conclude that it would have been obvious to one of ordinary skill in the art to perform a pair of shifts for each cycle of shifting. Pecahanek teaches communicating with other processing elements in four different directions (FF 7). As stated by the Examiner, it would have been obvious to one of ordinary skill in the art to perform a pair of shifts for each cycle of shifting (Ans. 10, §(9) 21.). We agree with the Examiner's conclusion that one of ordinary skill in the art would realize the up shifting process could be applied to shift columns going down to result in a lesser number of shifts and thus, shifting cycles (*id.* at 10-11).

We further find the Examiner did not use improper hindsight. In *KSR*, the U.S. Supreme Court reaffirmed that “[a] factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.” *KSR*, 550 U.S. at 421. *See also Graham*, 383 U.S. at 36. Nevertheless, in *KSR*, the Supreme Court also qualified the issue of hindsight by stating that “[r]igid preventative rules that

deny factfinders recourse to common sense, however, are neither necessary under our case law nor consistent with it.” *KSR*, 550 U.S. at 421.

In *KSR*, the Supreme Court further stated:

When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

*KSR*, 550 U.S. at 417.

This reasoning is applicable here.

Accordingly, we conclude the invention as recited in claims 22 and 29 would have been obvious to one of ordinary skill in the art.

### *Issue 5*

Based on the Examiner’s findings as to Penchanek’s teaching, that both references are being directed toward data movement and image processing, and that an ordinarily skilled artisan would have found it obvious to implement rotating data into a parallel processing architecture, we find the combination of the Crozier and Penchanek has a reasonable expectation of success. In particular, we find the predictable use of familiar prior art elements according to their established functions would have

clearly conveyed a reasonable expectation of success to a person of ordinary skill in the art at the time of the invention.

Appellant argues each reference individually again, stating that each only discloses one type of architecture. However, Appellant has failed to consider the combination of the technology, and that one skilled in the art would have had the skills to implement rotating data in a parallel architecture.

*Issue 6*

We disagree with Appellant's contention that the Examiner has only provided a broad conclusory statement as to why it would have been obvious to one of ordinary skill in the art to implement Crozier's method of image rotation of the parallel processor of Pechanek. Indeed, the Examiner has set forth reasons why one of ordinary skill in the art would have been motivated (Ans. 4, §(9) 3. – Ans. 14, §(9) 39. and Ans. 15, §(10) 40. – Ans. 17, §(10) 40.) with which we agree. Appellant has not presented any persuasive arguments as to why the Examiner's reasoning and rationale is in error. Thus, we conclude the Examiner articulated reasons for each argued claim, with a rational underpinning to support the legal conclusion of obviousness.

## CONCLUSION

Based on the findings of facts and analysis above, we conclude Appellant has not met the burden of showing the Examiner erred in rejecting the claims under 35 U.S.C. § 103(a).

We further conclude Appellant has not met the burden of showing the Examiner erred in finding Crozier and Pechanek teach the limitations of claims 1 and 8, claims 8 and 13, and claims 22 and 29.

We conclude Appellant has not met the burden of showing the Examiner erred in concluding one skilled in the art at the time of the invention would have had success in including the rotation technique of Crozier onto the processor of Pechanek.

Additionally, we conclude Appellant has not met the burden of showing the Examiner erred in concluding one skilled in the art at the time of the invention would have been motivated to include the rotation technique of Crozier onto the processor of Pechanek.

Accordingly, Appellant has not met the burden of showing the Examiner erred in rejecting of claims 1-6, 8-13, 15-20, 22-27, 29-34, and 36 under 35 U.S.C. § 103(a) as being unpatentable over Crozier and Pechanek.

Additionally, Appellant have not met the burden of showing the Examiner erred in rejecting of claims 7, 14, 21, 28, and 35 under 35 U.S.C. § 103(a) as being unpatentable over Crozier and Taylor.

#### *Obviousness Rejection Over Crozier, Pechanek, and Taylor*

Regarding the obviousness rejections of claims 7, 14, 21, 28, and 35 under 35 U.S.C. § 103(a) as being unpatentable over Crozier, Pechanek, and Taylor, we find that Appellant has not persuasively rebutted the Examiner's prima facie case of obviousness for these claims, but merely refers to the previous arguments made in connection with claim 1 (App. Br. 11, §(vii)B.).

Once the Examiner has satisfied the burden of presenting a prima facie case of obviousness, the burden then shifts to Appellant to present

evidence and/or arguments that persuasively rebut the Examiner's prima facie case. *See In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). Since Appellant did not particularly point out errors in the Examiner's reasoning to persuasively rebut the Examiner's prima facie case of obviousness, we will sustain the rejection for the same reasons indicated previously.

#### DECISION

The Examiner's rejection of claims 1-6, 8-13, 15-20, 22-27, 29-34, and 36 under 35 U.S.C. § 103(a) as being unpatentable over Crozier and Pechanek is affirmed.

The Examiner's rejection of claims 7, 14, 21, 28, and 35 under 35 U.S.C. § 103(a) as being unpatentable over Crozier, Pechanek, and Taylor is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

#### AFFIRMED

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